What is claimed is:

1. A cooling subsystem including a coolant and a circulation loop wherein:

   said coolant comprises a mixture of water and a glycol solvent;

   said circulation loop comprises an ion exchange unit; and

   wherein the electrical conductivity of said coolant is less than about 50 $\mu S/cm$ after said coolant passes through said ion exchange unit.

2. The cooling subsystem of claim 1 wherein said coolant consists of a mixture of water and said glycol solvent.

3. The cooling subsystem of claim 1 wherein said ion exchange unit comprises an acidic cation resin.

4. The cooling subsystem of claim 1 wherein said ion exchange unit comprises an alkaline anion resin.

5. The cooling subsystem of claim 1 wherein said ion exchange unit comprises an acidic cation resin and an alkaline anion resin.

6. The cooling subsystem of claim 1 wherein the temperature of said coolant mixture in said circulation loop is less than 100°C.

7. The cooling subsystem of claim 1 wherein said coolant comprises about 50% water and 50% glycol solvent by volume.

8. The cooling subsystem of claim 1 wherein said glycol solvent is propylene glycol or ethylene glycol.

9. The cooling subsystem of claim 1 wherein the electrical conductivity of said coolant is less than 5 $\mu S/cm$.

10. The use of the cooling subsystem of claim 1 in a fuel cell.

11. The use of the cooling subsystem of claim 1 in a fuel cell powered vehicle.

12. A liquid-cooled fuel cell system including a fuel cell stack and a cooling subsystem for cooling the fuel cell stack, the cooling subsystem including a glycol-containing liquid coolant and a circulation loop for circulating the liquid coolant in thermal contact with fuel cells in the stack, wherein:

the glycol-containing liquid coolant is characterized by a conductivity less than about 50 $\mu S/cm$; and the cooling subsystem additionally comprises means for maintaining the purity of the liquid coolant such that the conductivity of the liquid coolant is less than about 50 $\mu S/cm$.

13. The liquid-cooled fuel cell system of claim 12 wherein the fuel cell stack is a solid polymer fuel cell stack.

14. The liquid-cooled fuel cell system of claim 13 wherein the solid polymer fuel cell stack comprises membrane electrode assemblies in contact with the liquid coolant in the circulation loop.

15. The liquid-cooled fuel cell system of claim 13 wherein the solid polymer fuel cell stack operates at temperatures less than 100°C.

16. The liquid-cooled fuel cell system of claim 12 wherein the means for maintaining the purity of the liquid coolant comprises an ion exchange resin unit in the circulation loop of the cooling subsystem.

17. The liquid-cooled fuel cell system of claim 16 wherein the ion exchange resin unit employs an hydroxyl type 2 strong base anion resin.

18. The liquid-cooled fuel cell system of claim 12 wherein the liquid coolant is characterized by a conductivity less than about 5 $\mu S/cm$ and the cooling subsystem additionally comprises means for maintaining the purity of the liquid coolant such that the conductivity of the liquid coolant is less than about 5 $\mu S/cm$.

19. The liquid-cooled fuel cell system of claim 12 wherein the glycol-containing liquid coolant comprises a glycol selected from the group consisting of ethylene glycol, propylene glycol, polyethylene glycol, and polypropylene glycol.

20. The liquid-cooled fuel cell system of claim 19 wherein the glycol solvent is ethylene glycol.

21. The liquid-cooled fuel cell system of claim 12 wherein the liquid coolant additionally comprises water.

22. The liquid-cooled fuel cell system of claim 21 wherein the glycol to water ratio in the liquid coolant is about 1:1.

23. The liquid-cooled fuel cell system of claim 12 wherein the liquid coolant is in electrical contact with fuel cells in the fuel cell stack.

24. The liquid-cooled fuel cell system of claim 23 wherein the fuel cell stack is capable of operation at voltages greater than about 50 volts.

25. The liquid-cooled fuel cell system of claim 12 wherein the liquid coolant in the circulation loop is essentially isolated from air.

26. The liquid-cooled fuel cell system of claim 12 wherein the circulation loop comprises aluminum hardware exposed to the liquid coolant.

27. A method of providing antifreeze and corrosion protection for a fuel cell system, the fuel cell system including a fuel cell stack and a cooling subsystem for cooling the fuel cell stack, and the cooling subsystem including a liquid coolant and a circulation loop for circulating the liquid coolant in thermal contact with fuel cells in the stack, wherein the method comprises:

lowering the freezing temperature of the liquid coolant by incorporating a glycol in the liquid coolant; and

maintaining the purity of the liquid coolant in the cooling subsystem such that the conductivity of the liquid coolant remains less than about 50 μS/cm.

28. The method of claim 27 wherein the fuel cell stack is a solid polymer fuel cell stack.

29. The method of claim 27 wherein the liquid coolant is circulated through an ion exchange resin unit in the circulation loop of the cooling subsystem.

30. The method of claim 29 wherein the ion exchange resin unit employs an hydroxyl type 2 strong base anion resin.

31. The method of claim 27 wherein the liquid coolant is characterized by a conductivity less than about 5 μS/cm and the purity of the liquid coolant in the cooling subsystem is maintained such that the conductivity of the liquid coolant remains less than about 5 μS/cm.

32. The method of claim 27 wherein the glycol-containing liquid coolant comprises a glycol selected from the group consisting of ethylene glycol, propylene glycol, polyethylene glycol, and polypropylene glycol.

33. The method of claim 32 wherein the glycol used in the liquid coolant is ethylene glycol.

34. The method of claim 27 additionally comprising essentially isolating the liquid coolant in the circulation loop from air.